field is applied between electrodes **61** and **60**, causing buffer present in **57** to move towards **56**, where movement of the buffer front moves the elution plug comprising the concentrated analyte to intersection **51**. A voltage gradient is then applied between electrodes **58** and **59**, causing the narrow band of analyte present in the volume of elution buffer to move through separation channel **52**, yielding high efficiency separation of the organic analytes.

The above experiment is also performed in a modified version of the device depicted in FIG. **4**. In the modified device, in addition to reservoir **57**, the device comprises an elution buffer reservoir also in fluid communication with the enrichment channel **62**. In this experiment, sample is introduced into enrichment channel **62**, whereby the organic analytes present in the elution buffer reversibly bind to the C18 phase coated beads present in the enrichment channel. An electric field is applied between an electrode present in the elution buffer reservoir and electrode **60** for a limited period of time sufficient to cause 10 μl of elution buffer to migrate through the enrichment channel and release any reversibly bound organic analyte. After the elution buffer has moved into the enrichment channel, a voltage gradient is then applied between electrodes **61** and **60**, resulting in the movement of buffer from **57** to **56**, which carries the defined volume of organic analyte comprising elution buffer to intersection **51**, as described above.

It is evident from the above results and discussion that convenient, integrated microchannel electrophoretic devices are disclosed which provide for significant advantages over currently available CE and MCE devices. Because the subject devices comprise microchannels as electrophoretic flowpaths, they provide for all of the benefits of CE and MCE devices, including rapid run times, the ability to use small sample volumes, high separation efficiency, and the like. Since the subject integrated devices comprise an enrichment channel, they can be employed for the analysis of complex sample matrices comprising analyte concentrations in the femtomolar to nanomolar range. However, because of the particular positional relationship of the enrichment channel and the main electrophoretic flowpath, the shortcomings of on-line configurations, such as band broadening and the like, do not occur in the subject devices. As the subject devices are integrated and compact, they are easy to handle and can be readily used with automated devices. Finally, with the appropriate selection of materials, the devices can be fabricated so as to be disposable. Because of their versatility and the sensitivity they provide, the subject devices are suitable for use in a wide variety of applications, including clinical electrophoretic assays.

All publications and patent applications mentioned in this specification are herein incorporated by reference to the same extent as if each individual publication or patent application was specifically and individually indicated to be incorporated by reference.

The invention now being fully described, it will be apparent to one of ordinary skill in the art that many changes and modifications can be made thereto without departing from the spirit or scope of the appended claims.

What is claimed is:

1. A device for use in electrophoretic application, said device comprising a substrate having a generally planar surface on which are formed:

- a main electrophoretic microchannel defining a main electrophoretic flowpath, said main electrophoretic microchannel being provided with means for applying an electric field to media contained therein;
- an enrichment channel defining an enrichment flowpath in fluid conducting relation with said main electrophoretic flowpath, said enrichment channel containing an enrichment medium for enriching a particular fraction of a sample; and
- means for transferring a portion at least of said fraction from said enrichment channel to said main electrophoretic flowpath;
- said device further comprising an outlet in fluid conducting relation to said enrichment flowpath for discharging away from said main electrophoretic flowpath a portion of said sample other than said portion of said fraction.

2. The device according to claim **1** wherein said means for applying an electric field comprises at least one pair of electrodes connected to a source of electrical power for applying an electric field to said medium contained within said flowpath.

3. The device according to claim **1** wherein said enrichment channel further comprises an enriched fraction fluid outlet and is in direct fluid communication with said main electrophoretic flowpath, wherein said means for transferring said portion of said fraction is said enriched fraction fluid outlet.

4. The device according to claim **1** wherein said means for transferring said fraction comprises a secondary microchannel in fluid conducting relation with said enrichment flowpath and with said main electrophoretic flowpath said secondary microchannel defining a secondary flowpath.

5. The device according to claim **1**, said device further comprising a waste reservoir in fluid communication with said outlet.

6. The device according to claim **1** wherein said enrichment medium comprises a chromatographic material.

7. The device according to claim **1** wherein said enrichment medium comprises an electrophoretic gel medium.

8. A device for use in electrophoretic application, said device comprising a substrate having a generally planar surface on which are formed:

- a main electrophoretic microchannel of capillary dimension defining a main electrophoretic flowpath, said main electrophoretic microchannel being provided with means for applying an electrical field to media contained therein and reservoirs at either end for introducing fluid into said flowpath;
- an enrichment channel defining an enrichment flowpath in fluid conducting relation with said main electrophoretic flowpath, said enrichment channel containing a chromatographic medium for enriching a particular fraction of a sample; and
- a secondary electrophoretic microchannel defining a secondary electrophoretic flowpath in fluid conducting relation with said enrichment flowpath and said main electrophoretic flowpath for transferring a portion at least of said fraction from said enrichment channel to said main electrophoretic microchannel; and
- at least one pair of electrodes associated with each of said main and secondary electrophoretic microchannels;
- said device further comprising an outlet in fluid conducting relation to said enrichment flowpath for discharging away from said main electrophoretic flowpath a portion of said sample other than said portion at least of said fraction.

9. The device according to claim **8**, said enrichment channel further comprising means for controlling fluid flow within said enrichment channel.

10. The device according to claim **8** wherein said outlet is in fluid communication with a waste reservoir.